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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|------------------------|---------------------|------------------|
| 10/756,830 | 01/14/2004 | Douglas Van Den Broeke | 55071-329 | 3769 |

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EXAMINER

EVERHART, CARIDAD

ART UNIT PAPER NUMBER

2891

DATE MAILED: 05/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/756,830 | BROEKE ET AL. | |
| | Examiner | Art Unit | |
| | Caridad M. Everhart | 2891 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 March 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>3-2-06; 2-24-06</u> | 6) <input type="checkbox"/> Other: _____ |

Response to Arguments

Applicant has amended the claims to replace the recitation determining with generating. Applicant's arguments depend upon the amendment. Applicant has argued that that Pierrat does not disclose generating an interference map. The amendment and argument do not place the application in condition for allowance for the following reasons. Pierrat discloses generating by simulation intensity profiles (col. 4, lines 17-25 and col. 6, lines 17-25), which includes interference patterns caused by phase conflicts (col. 2, lines 6-9), as cited in the rejection below. Although Pierrat does not use the word interference map, Pierrat does carry out the steps of generating an interference map, as cited in the rejection below, and as argued herein. Applicant has argued that Pierrat does not indicate whether the interference is constructive, destructive, or neutral. The intensity profile generated by Pierrat indicates the type of interference by the intensity (col. 4, lines 17-25).

Claims 1-4, 8-11, 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pierrat (US 6,777,141 B2) in view of Adam (US 2004.0122636 A1).

Pierrat discloses the steps of obtaining a desired target pattern, which are the features of the pattern to be exposed, (col. 2, lines 26-27), the disclosure of the step of resolving phase conflicts (col. 2, lines 6-9) is interpreted to satisfy the limitation of determining interference, as interference is caused by phase conflicts, and the phase conflicts would include constructive and destructive interference, as these are the two types of phase conflicts which are possible. The placing of assist features is also

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taught(col. 4, lines 29-38), and the fact that the features minimize phase conflicts being taught is interpreted to satisfy the limitation that the assist features are placed based on the areas of constructive and destructive interference. The size of the features in the target pattern are less than the resolution capability, or sub-resolution(col. 4, lines 25-28). Optical simulation is performed(col. 6, lines 23-25 and 66-67 and col. 7, lines 1-10), and the teaching that the assist feature results in the features being narrower is interpreted as satisfying the limitation that the percentage transmission of the field area is greater than zero. The critical dimension of the features is defined as in claim 3(col. 6, lines 53-60). Neutral areas of interference would correspond to the zero degree of phase shift(col. 7, lines 23-27). The means for carrying out these steps are implied in the process disclosed as cited above. A simulation program is also disclosed(col. 6, lines 23-26), which is implied as containing the necessary files for directing the control by a computer for carrying out the process disclosed by Perrat, as cited above.

Perrat is silent with respect to a mapping.

Adam discloses the steps of obtaining a layout of openings which is interpreted to satisfy the limitation of obtaining a desired target pattern, as the layout of openings is the desired pattern of features to be exposed(paragraph 0054). Adam further discloses that the method can be applied to methods in which assist features are used in the photomask(paragraph 0058) in optical proximity correction methods(paragraph 0016). The method is a method for spectral mapping(claim 2). Edge diffraction is simulated, and as diffraction is the result of constructive and destructive interference, this is interpreted to satisfy the limitation of providing interference mapping.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the method of Adam with the method taught by Perrat in order to carry out the method of Perrat using simulation methods.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 5-7,12-14,19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pierrat in view of Adam as applied to claim 1 above, and further in view of Toublan, et al (US 6,807,662B2).

Pierrat in view of Adam is silent with respect to scatter bars, anti-scattering bars, non-printing assist features, and the positive and negative values of intensity as recited in the above claims.

Toublan et al disclose that assist features are formed in the form of scatter bars and printable or non-printable features(col. 7, lines 21-55 and col. 8, lines 38-50 and 58-67). With respect to anti-scattering bars, Toublan et al also describe clear regions that cause removal of scatter bars(col. 7,lines 31-36), which would correspond to anti-scattering bars.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have combined the disclosure made by Toublan et al with the process taught by Pierrat in view of Adam because the assist features in the process disclosed

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by Pierrat would be in the form of scatter bars and non-printing assist features in order to obtain the results of constructive and destructive interference taught by Pierrat.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


CARIDAD EVERHART
PRIMARY EXAMINER

C. Everhart
5-15-2006